REMARKS

Claims 1-3 are all the claims pending in the application.

The present Office Action follows a pair of remand orders from the Board of Appeals, between which the Examiner submitted an informal response, which has not yet been forwarded to Applicants despite the Request therefor filed on June 10, 2004. In any event, the remand orders essentially instruct the Examiner to enter one or more rejections under §112, which the Examiner has now done. The crux of the matter is the recitation of the "control means" in claim 1, with the Board apparently expressing concern that the structure of this component is not fully described in the specification. The Board was apparently undeterred by the Examiner's completely correct explanation that the structure of the "control means" is conventional and therefore need not be disclosed in detail, and is indeed not disclosed in detail in any number of patents which the Examiner is closely familiar with, including the prior art cited in this application. As the Examiner is well aware, it is the function, not the structure of the control means which is generally the important feature thereof, as these controllers can be designed or programmed to switch the power transistors in order to obtain unique current profiles which in turn are responsible for the novel machining or surface treatment effects attained.

By this amendment, Applicant has determined to render the issue moot by amending claim 1 to eliminate the "means plus function" language originally used. Thus, the term "control means" no longer appears in the present claim formulation. This amendment is considered to immediately overcome the Examiner's §112, second paragraph rejection, which was of course

premised upon an alleged inability to interpret the original "means plus function" language under § 112, paragraph 6.[1]

With respect to the § 112, paragraph 1 rejection, it is believed that the foregoing amendments avoid this rejection as well. The extent that this rejection might be considered applicable to the amended claims, it is apparent that the specification clearly enables one of skill in the art to make and use the claimed system. With regard to the controller or control unit in particular, the same would include the simple transistor-resistor network shown in Figure 1A, along with control element 14 which sends signals to turn on and turn off the transistors. Designing or programming the unit 14 to obtain the novel current profile illustrated in Fig. 1B or 1C, for example, is well within the purview of one skill in the art. It is noted in this regard that the Examiner's primary reference, Magara '380, illustrates the corresponding controller in precisely the same way (see Fig. 14).

The Examiner rejects claims 1-3 under 35 U.S.C. § 102(b) as being anticipated by Magara.

Magara discloses an electric discharge machining apparatus having a high-voltage superposition circuit that includes current limiting resistors R1 and R2, and transistors TR1 and TR2. During machining, an auxiliary power supply 10b supplies a high voltage to a machining gap 7 when transistor TR1 is switched ON, and thereafter transistor TR2 is switched ON to cause a main power supply 10a to supply a current of low energy.

[1] It is noted that the Examiner rejected claims 1 and 2 under §112, paragraph 2, although the "control means" limitation did not in fact appear in claim 2, which is a method claim. This was believed to be a minor oversight on the Examiner's part and accordingly is not further addressed.

The Examiner contends that in Magara, emission of the electrode material is suppressed during the first pulse width because during the first pulse width as contrasted with the second pulse width less emission of the electrode occurs. In addition, the Examiner also contends that the increase of the diameter of the electric discharge arc column during the first part of a discharge is inherent in Magara. Applicant will respond to these contentions in reverse order.

Assuming for sake of argument that the Examiner is correct that in Magara, the arc column will naturally enlarge, this is not the same as *controllably causing* the arc column to increase in diameter by controlling the current density. According to the invention, the pulse width and the pulse height, e.g., are specifically selected in order to obtain a current density permitting advantageous control over the arc column. This does not occur in Magara, wherein whatever arc enlargement occurs does so of its own accord in an uncontrolled fashion.

Similarly, while Magara teaches a step-up current impulse diagram shown in Fig. 16(b), nowhere in the Magara patent is it taught or suggested that the pulse width and the peak value are controlled in a stepwise manner so that the quantity of supply of hard coat material by emission of electrode material is also controlled. In other words, according to the present invention, the control means sets the first pulse width and the first peak value such that the current density between the electrodes can be in a predetermined range to suppress emission of electrode material. The mere fact that Magara's system may cause less emission in the lower current range does not equate to *controlling* the emission rate.

Finally, the claims require controlling the current density to a predetermined range. Magara says nothing about controlling current density, which is a parameter separate and apart from the size of the current pulse.

By way of contrast, the instant independent claims 1 and 2 specifically require that "the control means sets/(the step of) setting the first pulse width and the first peak value so that an electric current density between the electrodes can be in a predetermined range to suppress emission of electrode material, and so that during a period of the first pulse width a diameter of an electric discharge arc column is extended." The above features are not taught by Magara. In Magara an electric current density between the electrodes is not controlled by setting the first pulse width and the first peak value to suppress emission of electrode material.

With respect to claim 3, claim 3 positively claims that the amount of electrode erosion is intentionally increased to promote the appropriate release of coat-formation elements into the gap, following the initial suppression period. The Magara patent clearly does not envision such a methodology. Nor does it disclose the step of "setting the first pulse width and the first peak value so that an electric current density between the electrodes can be in a predetermined range to suppress emission of electrode material," as also required by claim 3.

Finally, Magara discloses that an auxiliary power supply and a main power supply of a high voltage are changed over by electric discharge generation. The purpose of using the auxiliary power supply is to allow electric discharge to be easily generated by applying high voltage between electrodes, and the auxiliary power supply changes over to the main power supply rapidly after electric discharge has been generated. Accordingly, Magara fails to teach

that the width of the current pulse that flows from the auxiliary power supply is controlled. In other words, it is not a parameter over which the operator of the machine has any control. As a result, the amount of material which is supplied from the electrode similarly is beyond operator control.

For the above reason, Applicants respectfully submit that the Examiner's premise in rejecting the current claims is incorrect. Thus, claims 1-3 are not anticipated by, nor suggested by, Magara.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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Date: November 4, 2004